What is claimed is:

1. An optical element for beam shaping of an optical laser beam emission of a diode laser, said optical element comprising:

a first element arranged for collimation of a fast axis of the laser beam emission; and

a second element arranged for rotation of the laser beam emission by substantially ±90°, characterized in that both said first and second elements are optically bonded to each other constituting at least a quasi-monolithic single optical element.

2. The optical element according to claim 1, wherein both elements constitute a single monolithic element.

3. The optical element according to claim 1, wherein said second element constitutes an array of optical beam rotation elements, optically bonded to each other constituting at least a quasi-monolithic single optical element.

4. The optical element according to claim 3, wherein said second element constitutes a single monolithic array of optical beam rotation elements.

5. The optical element according to claim 1, further comprising a third element for collimation of a slow axis of the laser beam emission,

characterized in that said third optical element is optically bonded to either side of said second element constituting at least a quasi-monolithic single optical element.

6. The optical element according to claim 5, wherein all three elements constitute a single monolithic element.

7. The optical element according to claim 5, wherein said third element constitutes a planar grin lens.

8. The optical element according to claim 5, wherein said third element constitutes a planar grin lens array.

9. The optical element according to claim 5, wherein said third element constitutes a surface curved in both or either of the directions orthogonal to the propagation direction.

10. The optical element according to claim 5, wherein said third element constitutes a multi-facet surface in both or either of the directions orthogonal to the propagation direction curved in both or either of the directions orthogonal to the propagation direction.

11. An optical element according to claim 5, further comprising cylindrical, spherical or aspherical lenses for coupling the diode beam into an optical fiber.

12. An optical element according to claim 1, further comprising cylindrical, spherical or aspherical lenses for coupling the diode beam into an optical fiber.

13. The optical element according to claim 1, further comprising a third element for collimation or expansion of the beam-rotated fast axis of the diode laser, characterized in that

said third optical element is optically bonded to said second element constituting a quasi-monolithic single optical element.

14. The optical element according to claim 13, wherein said first, second and third elements constitute a single monolithic element.

15. The optical element according to claim 1, further comprising a third element for simultaneous (i) collimation of a slow axis of the laser beam emission and (ii) collimation of the laser beam emission after said rotation of said fast axis of the diode laser, characterized in that said third optical element is optically bonded to said second element constituting a quasi-monolithic single optical element.

16. The optical element according to claim 15, wherein said first, second and third elements constitute a single monolithic element.

17. The optical element according to claim 1, where said first element constitutes a planar grin lens.

18. The optical element according to claim 1, wherein said first element constitutes a uni-axial optical element with its optical axis aligned parallel to a slow axis of the diode laser axis, said first element further comprising a curved input surface and a flat output surface.

19. The optical element according to claim 1, wherein said second element constitutes a planar grin lens array.

20. The planar grin lens array according to claim 19, wherein a pitch of said planar grin lens array is equal to approximately 0.5.

21. The planar grin lens array according to claim 19, wherein planes of equal refractive index in said planar grin lens array are aligned at an angle of substantially ±45° with respect to a plane defined by a propagation direction of said laser beam emission and a slow axis of the diode laser.

22. The planar grin lens array according to claim 21, wherein a pitch of said planar grin lens array is equal to approximately 0.5.

23. An optical system, comprising:

including a diode laser array, said diode laser array comprising well-spaced individual emitting areas aligned substantially along one line along their slow axis, said emitting areas further emitting individual optical beams;

a fast axis collimation lens for fast axis collimation of said individual optical beams; and

an optical beam inverting imaging array comprising individual array elements aligned such that said individual optical beams propagate through said individual array elements without substantial optical clipping and with substantially zero loss, each of said individual array elements imaging said individual optical beams with a magnification M of substantially $M=-1$,

wherein said optical beam inverting imaging array comprises an array of planar grin lenses.

24. The optical system according to claim 23, wherein each of said individual array elements images a respective one of said individual optical beams.

25. The optical system according to claim 23, wherein said array of planar grin lenses comprises planes of equal refractive index comprising an angle of substantially ±45° with respect to a respective plane comprised of a propagation direction and a slow axis of respective ones of said emitter areas.

26. The optical system according to claim 23, wherein said optical beam inverting imaging array is comprised of an array of two sets of uni-axial grin lenses, with their optical axis comprising an angle of substantially ±45° with respect to a slow axis of said diode laser array, spaced apart by a distance so as to provide an optical magnification M of substantially M= –1.

27. The optical system according to claim 23, wherein said optical beam inverting imaging array comprises an array of two sets of planar grin lenses, each of said planar grin lenses comprising planes of equal refractive index having an angle of substantially ±45° with respect to a plane defined by a propagation direction and a slow axis of said diode laser array, said sets of planar grim lenses spaced apart from each other by a distance so as to provide an optical magnification M of substantially M= –1.

28. The optical system according to claim 23, wherein said optical beam inverting imaging array is comprised of an array of two sets of cylindrical Fresnel lenses with their optical axes comprising an angle of substantially ±45° with respect to a slow axis of said diode laser array, said sets of cylindrical Fresnel lenses spaced apart from each other by a distance so as to provide an optical magnification M of substantially $M=-1$.

29. The optical system according to claim 23, wherein said optical beam inverting imaging array is comprised of two arrays of uni-axial focusing reflective optic elements, with their optical axes comprising an angle of substantially ±45° with respect to a slow axis of said diode laser array, spaced apart from the other by a distance so as to provide an optical magnification M of substantially $M=-1$.

30. The optical system according to claim 23, further comprising a multi-facet lens for collimating the slow axis of each of said individual optical beams, characterized in that a location of the multi-facet lens is selected such that said multi-facet lens is the first optical element that is encountered by said individual optical beams after passage through said fast axis collimation lens.

31. The optical system according to claim 23, further comprising:

multi-facet optical elements for beam homogenizing; and

coupling elements for coupling the diode laser array output into an optical fiber.

32. The optical system according to claim 31, wherein said coupling elements comprises optical elements selected from the groups consisting of cylindrical, spherical and aspherical elements.

33. The optical system according to claim 23, further comprising multiple duplicates of said optical element characterized in that a majority of said optical elements is coupled into multiple optical fibers, said multiple optical fibers aligned in at least one optical fiber bundle so as to provide at least one beam of ultra-high optical power.

34. The optical system according to claim 33, wherein said multiple optical fibers comprise multiple fiber tapers positioned between said multiple optical systems and said at least one fiber bundle, characterized in that the fiber diameter in said fiber bundles is smaller than the fiber diameter at the output of said multiple optical systems.

35. The optical system according to claim 33, wherein said multiple fibers are metallized and fused together to form at least one fiber bundle.

36. The optical system according to claim 35, wherein said fiber bundle is connected to a heat sink.

37. An optical element for beam shaping of optical diode laser beams comprising:

an arrangement of at least one lens and one grin lens;

at least one element for collimation of a fast axis of the diode laser;

characterized in that all elements are optically bonded to each other constituting a single optical element.

38. An optical element for coupling an optical diode laser beam into an optical fiber comprising an arrangement of a least one lens and one grin lens, characterized in that all elements are optically bonded to each other constituting a single optical element.

39. An optical device comprising:

a plurality of optical elements for shaping a respective laser beam emission of a respective diode laser, each of said optical elements including (i) a first component element arranged for collimation of a fast axis of a respective laser beam emission and (ii) a second component element arranged for rotation of a respective laser beam emission by substantially ±90°;

respective pairs of said first and second component elements optically bonded to each other to form at least a quasi-monolithic single optical element;

said optical elements coupled into a multiple of optical fibers aligned in an optical fiber bundle so as to provide at least one combined beam of high optical power.